PROCEEDINGS OF SPIE REPRINT

SPIE—The International Society for Optical Engineering

EOS aqua AMSR-E Arctic sea ice validation program

D. J. Cavalieri, J. Maslanik, T. Markus, J. C. Stroeve, M. Sturm, J. Heinrichs, E. Kim, A. J. Gasiewski, J. C. Comiso

Reprinted from

Microwave Remote Sensing of the Atmosphere and Environment III

24–25 October 2002
Hangzhou, China

Volume 4894

EOS Aqua AMSR-E Arctic sea ice validation program

D. J. Cavalieri[a]*, J. Maslanik[b], T. Markus[a], J. Stroeve[b], M. Sturm[c], J. Heinrichs[d], E. Kim[a], A. J. Gasiewski[e], J. C. Comiso[a]

[a]Laboratory for Hydrospheric Processes, NASA Goddard Space Flight Center, Greenbelt, Maryland 20771; [b]University of Colorado, Boulder, CO 80309; [c]Cold Regions Research and Engineering Laboratory, USA-CRREL-Alaska, Ft. Wainwright, AK 99703; [d]Dept. of Geosciences, Fort Hays State University, Hays, KS 67601;

[e]NOAA Environmental Technology Laboratory, Boulder CO 80305

ABSTRACT

The National Space Development Agency of Japan Advanced Microwave Scanning Radiometer (AMSR-E) was successfully launched on NASA's EOS Aqua spacecraft on May 4, 2002. This new state-of-the-art satellite radiometer will provide a wider range of frequencies and twice the spatial resolution than is currently available with the DMSP SSM/I. New sea ice algorithms have been developed for use with the AMSR-E. The standard sea ice products to be provided include sea ice concentration at spatial resolutions of 12.5 km and 25.0 km, snow depth on sea ice at a spatial resolution of 12.5 km, and sea ice temperature at a spatial resolution of 25 km. This paper provides a summary of our plans to validate the AMSR-E sea ice products in the Arctic. The overall validation program consists of three elements: satellite data comparisons, coordinated satellite/aircraft/surface comparisons, and a modeling and sensitivity analysis component. The first coordinated satellite/aircraft/surface Arctic campaign is planned for March 2003. A second campaign is planned for March 2005.

Keywords: AMSR-E, sea ice, validation, Arctic

1. INTRODUCTION

The EOS Aqua Advanced Microwave Scanning Radiometer (AMSR-E) Arctic sea ice validation program consists of three main components: sea ice product comparisons using coincident spaceborne data, comparisons using aircraft and surface data, and sensitivity and model analyses. This paper outlines each component and the methods to be used to meet the validation objectives.

All of the AMSR-E sea ice standard products will be Level 3 products. These products include sea ice concentration, sea ice temperature, and snow depth on sea ice and will be mapped to a polar stereographic projection, the same as used for SSM/I data in which data are projected to a plane at 70° latitude in both hemispheres[1]. The rationale for mapping the AMSR-E sea ice products to the SSM/I grid is to provide the research community consistency and continuity with the existing 24-year Nimbus 7 SMMR and DMSP SSM/I sea ice concentration products currently archived and distributed by the National Snow and Ice Data Center[1]. Brightness temperatures (TBs) will also be archived on the SSM/I grid. Except for snow depth which is a 5-day averaged product, all the other sea ice and TB products are provided on a daily basis as ascending node, descending node, and daily averages. The grid resolution of each Level 3 product is as follows:

a) TBs for all AMSR-E channels: 25-km resolution
b) TBs for the 18, 23, 36, and 89 GHz channels: 12.5-km resolution
c) TBs for the 89 GHz channels: 6.25-km resolution
d) Sea ice concentration: 12.5-km, 25-km resolutions
e) Sea ice temperature: 25-km resolution
f) Snow depth on sea ice: 12.5-km resolution.

*donald.j.cavalieri@gsfc.nasa.gov; phone 1 301 614-5901; fax 1 301 614-5644; Code 971 NASA Goddard Space Flight Center, Greenbelt, Maryland 20771 USA;

Microwave Remote Sensing of the Atmosphere and Environment III, Christian D. Kummerow, JingShang Jiang, Seiho Uratuka, Editors, Proceedings of SPIE Vol. 4894 (2003) © 2003 SPIE · 0277-786X/03/$15.00